Studebaker's Wagons

Patrick H. Stakem

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"Go west..." Horace Greeley

Introduction

This book discusses the Studebaker family, who came to Maryland in 1736. They came from Solingen, Germany, via the Netherlands and Philadelphia. The head of the family, Peter Studebaker, was a Master Iron Smith. He and his brother Clement set up a business in Hagerstown, Maryland, among fellow German immigrants. They continued to use their skills as iron manufacturers. At Hagerstown, they found ample coal, limestone, and iron ore, but also oil shale, which turned out to be a "magic ingredient." They manufactured superior iron products, and was able to produce treated wood, which they used to build their house, barns, and workshops. The wood beams, today, are as good as when they made them. Descendants of Studebaker still reside in the area.

They manufactured wagons, particularly the Conestoga design and later the Prairie Schooners, for farmers and immigrants heading west. Peter's grandsons moved to South Bend (of the St. Joseph River), Indiana, setting up a wagon works, and were among the first adopters of electric, and later, gasoline vehicles.

Author

The author is from Cumberland, Maryland, and currently lives in Laurel, MD.

Mr. Stakem is a member of the Council of the Alleghenies, as well as the Western Maryland Chapter of the National Railway Historical Society, the Mount Savage Historical Society, the Westernport Heritage Society, and the C&O Canal Association. He has published numerous articles and books on the railroads, canal, and industrial and transportation heritage of Western Maryland. He is associated with the Johns Hopkins University.

Mr. Peter Studebaker

Peter Studebaker was a member of the German Cutler Guild in Soligen, Germany. He would pass his techniques and trade secrets on to his sons and descendants. Soligen, in the North Rhine-Westphalia region of the Ruhr Valley, is known as the City of Blades. They have been making fine-edged utensils, scissors, and weapons since medieval times. Blacksmithing has been going on for more than 2,000 years. The area is known for the quality of its steel.

The region had seen frequent wars, the resultant taxation to fund the wars, and there was religious strife. The Studebakers were one of many families emigrating to Pennsylvania, becoming the Pennsylvania Dutch (Deutsch).

The guilds did not want to lose members, particularly those who knew trade secrets about making superior steel. The family was allowed to leave, but Peter and his brother Clement first had to relocate locally and work for 5 years in a different trade. They moved to Hagen, but the new trade they took up is not mentioned. The brothers got married in their new town, and left there in 5 years to sail to America via the port of Rotterdam,

Upon the families arrival at the Philadelphia port of entry in 1736, the family name, Stutenbecker, was anglicized to Studebaker by a clerk. They settled in Germantown, Pa, now a suburb of Philadelphia. They could speak the language of the neighborhood, and were surrounded by Quakers and Mennonites. In 1737, they wrote back to their other brothers in Germany urging them to come to the new world as well.

Some of the family came, but, unfortunately, cousin Heinrich and family were casualties of an Indian raid in the French and Indian War.

In 1740, Peter constructed his substantial house and manufacturing center at what is now 16830 Broadfording Road, just outside of Elizabethtown (now, Hagerstown), Maryland. It remains remarkable intact. The location is known as Baker's Lookout. It is

in Washington County, which, in Studebaker's time, was part of Prince Georges County.

Peter, and his son Peter, are found on the tax rolls of Huntingdon Township, York County, Pennsylvania in 1789. Peter's son John was the father of the 5 boys who would later go out to South Bend. They were born in Adams County, Pa. Peter bought property near Gettysburg in 1830. He was a blacksmith and wagon maker. He sold out in 1835, and moved the family to Ashland, Ohio in 1835, using three wagons, one of the Conestoga design, the other's probably being farm wagons. The Conestoga wagons ruled the road, measuring around 18 feet long, 21 feet tall, and capable of hauling up to five tons of cargo. In the new area, he again was a practicing wagon smith, and blacksmith.

John Clement Studebaker was born in Pennsylvania, and moved to Getty's Town (Gettysburg) after getting married in 1830. He also became a wagon maker and blacksmith, His business motto was “always give more than you promise,” which, much later, became the motto of the Studebaker Automotive Company.

In 1830, he build a Conestoga style wagon and moved his family to South Hold, a town in Indiana. Much later, South Hold was renamed South Bend, and it was here the wagon makers thrived. Peter would have been proud.

Timeline

This section will show the relationship of various Studebaker activities in the local and global context.

1608 – John Smith discovers iron ore in Maryland

1736 – Peter Studebaker family arrives in Philadelphia on the ship *Harle*, from Rotterdam, Holland. Peter Studebaker acquires land in Pennsylvania.

1739 – Peter Studebaker settles near what will become Hagerstown, Maryland.

1740 - Peter Studebaker acquires 100 acres of land, *Baker's Lookout,* near Hagerstown, MD*n.* Constructs First Studebaker wagon factory (still standing).

1747 – Studebaker built a bridge over the Conococheague Creek to provide better access to their forge, and wagon shop.

1751 – Peter Studebaker dies. Peter Studebaker, Jr. sells Baker's Lookout.

1753 A young George Washington is sent by Governor Dinwiddie of the Virginia Colony to tell the French to leave western Pennsylvania. At this point, anything west of Maryland and Pennsylvania was part of Canada. The French declined.

1753-53 British mount an expedition under General Braddock to take Fort Duquesne (present day Pittsburgh). It does not end well.

1754 – Peter Studebaker's Estate is settled, with Johnathan Hager as Executor. Value – 368 pounds, 15 shillings.

1754-63 Seven Years War, in Europe, of which the French & Indian War in America is part.

1755 – Braddock's troops defeated by the French, and Braddock is killed.

1758 – Expedition by General Forbes captures Fort Duquesne.

1776 – American Revolution.

1785 – Peter Jr. moved to 296 acres in Westmoreland Co. Pa.

1798-99 Tax roles show Peter and Peter Jr.

1830 John Studebaker, son of Peter is in Gettysburg.

1833 John Mohler Studebaker born in Philadelphia, son of Peter.

1835 John moves family to Ohio, then to Indiana.

1848-55 California Gold Rush drives market for wagons and tools

1850 – Clement and Harry move to Indiana.

1852 – Henry & Clement form Studebaker Wagon Company. Brother John M. moves to California for 5 months.

1858 – John M. moves to South Bend, having amassed a fortune building wheel barrows for gold miners.

1861 – First government contract. Company implements drying kilns to expedite wagon construction.

1861-65 – Wagons supplied to the Union Army.

1868 – Studebaker Brothers Manufacturing Company formed to build wagons.

1869 – Transcontinental railroad completed. More wagons are needed for the "final mile" delivery.

1870 – Jacob becomes Director of the carriage works. Company is the largest manufacturer of horse drawn vehicles in the world.

1875 – Sales top $1 million.

1898 – 75,000 wagons sold that year. First motor vehicle (electric) built. Edison buys one.

1902 – Studebaker enters the automobile business.

1914 – 3,000 wagons built for U. K. for World War-I use.

1920 – First motor truck built. Horse-drawn vehicles dropped from production.

1963 – Plant in South Bend ceases production.

1967 – Company ceases to exist.

2018 - The Studebaker Family National Association estimates Peter has over 250,000 descendants. Some of these still reside in Hagerstown.

Iron Production

Iron production requires three input materials, iron ore, coal or coke, and a fluxing agent, such as limestone. There is ample supplies of these in the vicinity of Hagerstown.

The Raw Materials

Near Hagerstown, in the Blue Ridge region, there are abundant amounts of limestone. There were once extensive forests to supply wood for charcoal.

Near Clearspring, Md, there is iron-ore rich land. The Antietam Furnace, some 6 miles east of Hagerstown along South Mountain, operated from 1768 through 1775. It used charcoal, and limestone and ore were mining locally. The blast was provided by a water-driven bellows. The Mount Aetna Furnace, about 1 mile west, was larger.

Iron Ore

One key ingredient of a blast furnace is the blast. Studebaker probably used a water powered bellows.

Pig iron, so called because of the arrangement for tapping the furnace, is not terribly difficult to make. You need iron ore, a fluxing agent, a source of pure carbon, and enough heat to get to

2797 degrees F.

The preferred fuel is coke, nearly pure carbon, made from coal. The preferred blast is heated air. The limestone serves as a flux, to collect the impurities from the ore. Iron ore was mined locally, and limestone came from nearby quarries. Coal was burned into coke on site in long pits. This removed the sulfur and phosphorous, which interfered with the iron extraction process. The process of extracting iron from ore is less of a melting process than a chemical reduction process. The carbon from the coke binds with the oxygen from the iron oxides in the ore, and goes off as carbon dioxide and carbon monoxide. Sometimes, the iron ore was also roasted before being introduced into the furnace. This served to help remove contaminants present in the raw ore.

But cast iron, or pig iron is at best an intermediate product. It is not strong in tension, and not suited for many applications beyond casting simple implements. The follow-on process makes wrought iron from pig. Small batches of wrought iron can be produced by a blacksmith at a forge. Larger production requires a different type of furnace.

Limestone

The fluxing agent for the blast is usually limestone, a form of calcium carbonate ($CaCO_3$). The fluxing agent removes impurities from the iron and coal or coke, and cools to a material called slag. Slag is usually glassy, and has different colors, depending on the impurities. It's mostly a waste material, but can be used for roadbeds.

Coal

The fuel for the furnace is either charcoal, or coke. Charcoal is the result of burning wood in a controlled oxygen environment. Mostly any vegetable matter will work. This can be accomplished by covering the fire with dirt, or roasting the wood in an enclosed oven, a process called pyrolysis. The idea is to get rid of

everything but the carbon. Charcoal can burn at up to 2700 degrees C, and is essentially pure carbon, with some impurities. When we apply this same process to coal, we get coke.

Studebaker had access to nearby coal deposits for his furnace and forge. He may have extracted the iron from ore using coal, and then remelted the resultant iron (“pigs”) with oil shale, which burns hotter. Chromite, discussed below, might have been the magic ingredient in his iron. Although he probably did not make stainless steel, or any kind of steel for that matter, a chrome coating on the iron would add to its durability.

The traditional shape of the molds used for these ingots was a branching structure formed in sand, with many individual ingots at right angles to a central channel or runner. Such a configuration is similar in appearance to a litter of piglets suckling on a sow. When the metal had cooled and hardened, the smaller ingots (the pigs) were simply broken from the much thinner runner (the sow), hence the name pig iron. As pig iron is intended for remelting, the uneven size of the ingots and inclusion of small amounts of sand was insignificant compared to the ease of casting and of handling.

The furnace can be operated continuously, as liquid iron and slag are drawn off at the bottom, then the tapping holes are re-plugged with clay. The furnace is “charged” or filled from the top, which is why many furnaces are built against a hillside. The continuous process is efficient, since the furnace doesn't need to cool and be reheated. Generally, a furnace will last about a year, before it has to be rebuilt or relined.

In a simple cases, a furnace is charged, allowed to burn out, the iron extracted, and the furnace recharged. This would be done if there is no convenient way to get wheelbarrows of the raw materials to the top.

Pig iron is then remelted and a strong current of air is directed over it while it is being stirred or agitated. This causes the dissolved impurities (such as silicon) to be thoroughly oxidized. The metal is

then cast into molds or used in other processes. Good for plows, pots, horse shoes, and wagon parts. Most of the iron wagon parts would have been made at the blacksmith's forge.

Blast

Blast refers to forced induction of air to the furnace to produce a hotter burn. This can be done with a hand- or water-powered bellows, or a water or steam engine powered "blowing engine" The bellows produces puffs of air, whereas the blowing engine can produce a steady draft. The blast enters the furnace through nozzles called "tuyeres." These can be water-cooled to prevent melting. The inducted air is usually heated first before entering the furnace, which enhances the process.

Oil Shale, Rocks that burn.

Heating oil shale releases a hydro-carbon vapor via pyrolysis. Oil shale will burn directly, leaving behind the sedimentary rock as ash. Near the bridge that Studebaker built over Conococheague Creek in 1740 there is a massive deposit of oil shale. With forced draft, charcoal burns at 2,700 degrees F, and coal burns at 3590 F, Oil shale burns at 1150 F, so can't be used directly to make iron.

Chromite

Chromite is the only ore of the element chromium. It has the chemical composition $FeCr_2O_4$. It is used as a plating to provide corrosion resistance to iron and steel, and is the key ingredient in stainless steel. Chromite is found in the Potomac Plateau of Maryland, near Baltimore. A chrome plating on iron items prevents rusting. There is no direct evidence that Studebaker used this technique, but he would have been familiar with it from his earlier work in Germany. In the mid-1800's, Maryland and adjacent Pennsylvania provided most of the world's chromite.

Wood Treatment and Preservation

Ample wood was found on Peter's property, and a water-powered saw mill would have been constructed. After he built his home and manufacturing facilities, he could turn to construction of wagons for the local farmers. These were manufactured of wood, with metal fittings.

Wood doesn't have a long life when exposed to the elements. Structural uses imply we are relying on the wood to support something. Besides water, insects and fungus are the enemy of wood.

There are various ways to remedy this. The wood can be painted. The early Greeks soaked their bridge timbers in olive oil. The Romans used tar on their ship timbers. By the later half of the 19th century, creosote, a tar derived from wood or coal, was the favored approach, and is still used. By 2003, the industry stopped using arsenic and chromium as preservatives.

Mr. Studebaker's house, barn, and workshops are still standing, at at Baker's Lookout, 16830 Broadfording Road, Hagerstown, MD (21740). The original chestnut beams show no sign of aging or water damage. The 275 year old wood has not rotted, or shrunk

What did Mr. Studebaker use as a wood preservative for his wagons and structures? Oil shale. If the wooden beams and wagon planks were heated with oil shale, they would be well-preserved. Am early advertisement for Studebaker is labeled, “The Secret of the Strength of the Studebaker Wagon lies in Scientific curing of the timber employed in its construction.“ The lumber was not only kiln-dried, but it would absorb some of the oil in the process.

Wagons

The first major use of wagons in North America was to provide support for the Braddock Expedition against Fort Duquesne. This was part of a larger World War between England and France. Most of the wagons were made of wood, with some iron parts. Many Farmer's wagons were in use in Pennsylvania. The Braddock

expedition of 1750 brought few of their own British Military wagons, but sought to rent a lot from the local farmers, along with horses and teamsters. The farmers wagons were typically rated for 1,400 pounds of cargo. These “Dutch” wagons were mostly built in Pennsylvania. A design from the Town of Conestoga, Pennsylvania, became the defacto standard.

The British military wagon, long used in Europe, had a capacity of 5 to 6 tons.

In the French and Indian War in the 1750's and 60's, a large number of wagons were needed for logistics. England had brought soldiers and cannon, and their officer's horses. They didn't have enough room on the ships for burden wagons and draft horses. Although reluctant to let go of their wagons, teams, and children for teamsters, it took the intervention of Benjamin Franklin, to avoid confiscation. The farmer's wagons were smaller than the standard British military wagon. More horses were needed to haul the military gear. The British did pay the farmers for the use of their wagons, and reimbursed for loss. Some 150 wagons were burned during the retreat.

A different design for a wagon for use in the Appalachian mountains had evolved. It swept up at each end, to prevent loads from shifting. It had a canvas top to keep thing dry, It was built to work on poor roads, essentially Indian paths through the wilderness of western Pennsylvania. It was named for the Pennsylvania town of Conestoga, which was in turn named for a tribe of Native Americans. Located in the south-central region of the State, the region around Conestoga was settled by sturdy pioneers from Germany, Switzerland, England, Ireland, and Wales, before the French and Indian war.

Later, crossing the country required a different style of wagon. These became to be known as Prairie Schooners, since their canvas tops looked like sails. In fact sails and wagon covers are made from the same material, heavy canvas. The prairie wagons were built flat, and were good for river fording. Most of these were

made in St. Louis. And called *Murphy's*, after their builder. They had iron axles. They were sometimes used in pairs, with the lead wagon's capacity of 6,500 pounds, and the trailer capacity of 4,000 lbs. They were generally used with 7 yoke of oxen (14 animals). In steep and difficult territory, the wagons could be disconnected, and hauled one at a time. An advertisement in the Arizona Journal-Miner of July, 1908, mentions The Samuel Hill Hardware Company buyingt the entire stock from manufacturers Schuttler, and Bain.

Hand-forged iron is an important part of the overall design of the wagon, consisting of ornate tool box hardware, hound plates, axe carriers, and stay chains. The iron tires were made undersized, and heated red hot before assembly. As they cooled, they shrank to firmly grip the wheel.

During the Civil War, Studebaker built large numbers of wagons, caissons, ambulances, and beer carts for the Union Army. In spite of being pacifists, some family members fought for the Union.

Later, the California gold rush would require a lot of wagons to close the gap, before the Transcontinental Railroad was complete. The completion did not reduce the demand for wagons, as more and more farming families in the west needed wagons. The military needed supply logistics for the numerous outposts in Indian Territory, and later, to supply the tribes as part of the Peace agreement.

It is estimated that Studebaker wagons were used by half of the parties in the Westward Migrations, that occurred between 1830 and 1870. The transcontinental railroad took over a lot of the long-haul traffic after 1869. There was even more demand for freight wagons for that “final mile” delivery of goods. The California Gold rush of 1848-1855 stirred further interest in getting west.

Studebaker also supplied metal fittings for other manufacturers. Wagons built in South Bend could be picked up at the factory, or

shipped by train to the customer.

The basic wagon could be outfitted in many ways. In addition, different sizes were available depending on the draught animal – mules, horses, or oxen. Each had their advantages and disadvantages. The horses would generally be 16 hands tall, and weigh aroundt 1,800 pounds. A team of four or six could be used. A large wagon would have a capacity of around 10,000 pounds.

Studebaker also built carriages to carry people, and these were smaller, lighter weight, and had better springs. A single horse buggy would be used by the doctors on patient visits. There were also smaller versions of the wagons and buggy's for children, pulled by dogs or goats. These were priced around $10. new.

Studebaker also made stagecoaches and mail coaches after the Civil War. One is show in the catalog of the 1893 Columbian Exposition in Chicago. Some of these were produced under license from Companies such as Abbot & Downing, in New Hampshire. This design was called the Concord style.

Rumors abound of Studebaker wagons still in daily usage in developing countries. Keep an eye out on your travels. Usually, the metal parts will be cast with the Studebaker name.

The basic flat-body wagon could be outfitted with a large, horizontal barrel to haul liquids. Variations on this included fire trucks, and road sprinklers. Custom wagons were used in cities to deliver the mail. They could be outfitted with stoves and cabinets for use as chuck wagons. Freight and passenger services used stage coaches. Basically, whatever feature we find today on a truck chassis could be found on wagons back then.

Design and Construction of the wagons.

Building a wagon involves working in wood and metal. Early on, there were no standard parts available. If you wanted metal parts, you went to a blacksmith. If you needed cut lumber, you went to a sawmill. Generally, the wood was aged for three years before use.

In addition, we speculate that Studebaker treated the wood in the fumes of burning oil share to extend its working life.

Studebaker had all this at his Hagerstown property. He had an iron furnace to provide iron for his forge.Aat his forge, he made the metal parts he needed, including bolts. A blacksmith can make his own tools, including an anvil, hammer, screw-threader, bolts and nuts, etc. A smith can forge weld two pieces or iron together. Another useful tool that the smith could supply is the wagon jack. Wagons did not carry spare wheels. If one was damaged, it had to be repaired. This required a wagon jack, and some tools and spare spokes.

Using the pig iron from an iron furnace, the blacksmith reheats it in his forge, and adds a controlled amount of carbon to achieve the right mixture of toughness and ductability.

The metal parts for a wagon included chains for the wheel lock and breast chains for the horses. There was also a need for hobbles for the horses, to keep them from wandering off when they were not in harness. Later wagons would have ice cutters for the wheels, for the same reasons we have snow chains for the car. Most importantly, the blacksmith made horse shoes and nails to attach them. He could also make bells.

Wagons generally had an axe carrier, along the side, and a trough at the back for feeding he horses. There was a wooden bucket with iron straps for watering the animals. There was usually a tool box, and a detachable gate at the back of the wagon. Brakes were wooden shoes that rubbed against the wheel, and these involved some iron rods and a handle.

Wagons did not typically have seats, and the driver either walked or rode the wheel horse, the horse closest to the wagon on the left side. There was also a board that slide out from between the wheels on the left side, called the lazy-board.

Wheels where made by wheelwrights. These consisted of a wooden hub, turned wooden spindles, and the rim pieces, known as felloes. Strakes were originally nailed to the hub, but later

practice was to shrink a metal hoop on the rim. It might also have nails. Although the wagon wouldn't usually carry a spare, they did come with 6 wheels, two being special “winter wheels.” The front wheels, traditionally, were 48 inches in diameter with 12 spokes, and the rear were 52-50 inches, with 16 spokes. They would have hub caps to keep mud out of the spindle. The wagon would have a tar or grease pot to allow for greasing the wheels.

The wheel hub starts as a solid block of well seasoned hardwood, and is turned on a lathe. It is reinforced by shrunk-on metal bands.

The nave would be made of elm, the spokes of oak, and the felloes of ash. This depended on what was available. It was typical to treat the wooden wheel part in boiling linseed oil, for water protection. Skeins, made of iron, are the bearing surface for the wheel hubs.

The front and rear axles were joined by a long beam called the reach. This formed the structure of the wagon, and would support whatever body was needed. The front axle pivoted to steer, by means of a flat circle plate, sometimes called the fifth wheel (This terminology has carried over to modern-day tractor-trailers). A matching plate is located on the wagon side, and the two plates are joined by a large bolt, to allow rotation. The front axle assembly had a tongue, a long pole going forward, to which the draft animals could be attached. Both the front and back axles had a cross beam above the axle. This was called the bolster, to which the wagon bed is attached. There are vertical bolsters to keep the wagon bed from slipping sideways on the bolster beam.

The wagons traditionally were painted blue in the bed, with vermilion running gear. Seamstresses made the canvas cover. The rig, ready to roll, would weigh in the neighborhood of 3,000 pounds.

In 1820, a wagon would take four men 2 months to build, and sell for around $250.

Studebaker was probably good at all of these skills, and served as the crew chief, as a wheelwright, blacksmith, and saw mill

operators would do the work under his direction. For a craftsman such as he was, I would suspect he did some of the work himself.

The Pacific Rural Press said in Volume 1, Number 15, 15 April 1871:

(note some of the original text is illegible)

The Studebaker Farm Wagon

“Since the completion of the railroad across the continent and the consequent increased facilities of commerce between the States coast and west of the Rocky Mountains, all our industrial pursuits have been brought into close competition with those of the East. Especially has this been the case with our manufactories, and none have felt this competition more keenly than our wagon makers.

The Studebaker company are the pioneers in this enterprise and they probably sell more wagons here than all other Eastern companies combined. They have shipped over the railroad to California the past year over (xx) wagons and carriages of all descriptions valued at $75,100. Their organization for the sale of their wagons, is complete. Their principal or grand agency is at Sacramento, their agent being Ames Woolverton, through whom all the business of the company on this coast is transacted. It may not be uninteresting to our readers to know something of a company who though so far away are working such a change in this branch of our manufacturing interests and supplying so many of us with that indispensable agricultural machine the "Farm Wagon."”

Two of the brothers Studebaker commenced the manufacture of wagons in a small and rude shop at South Bend, in 1852, with a capital of but $xx. By good workmanship and strict attention to business they soon built up an extensive and profitable local trade. It was nearly four years before they shipped or sold any of their wagons outside of their immediate neighborhood; but their reputation spread gradually farther and farther from home in all

directions and orders began to come in from greater distances, and now the " Studebaker Farm Wagon " is used in almost all parts of the United States, and has a reputation almost as extensive as the celebrated Concord stage coaches.

During the Civil war, the huge number of wagons required a large number of craftsmen and laborers, and a streamlining of production methods.

The company now consisted of four brothers, all mechanics, and the capital employed in the business is half a million dollars, all of which has been made in it since the small beginning at South Bend. Last year 250 men wore constantly employed, and 6,500 vehicles were turned out of their shops. They consumed 2,000,000 pounds of iron and 3,000,000 feet of lumber. Their iron is all purchased of the iron manufactories, made to order, of the exact quality, size and length desired, and so with their lumber and other material. Nothing is bought that is not wanted and nothing is wasted. They will this year turn out over 7,000 vehicles, and by the end of the year will have so extended and increased their shops and machinery as to be prepared to turn out annually thereafter 10,000 or very nearly one wagon for every twenty minutes of working time in the year. We have given the history and achievements of this firm or company as an example of what may be done in a manufacturing line by a harmonious combination of mechanical skill, business capacity, and integrity."

At the outbreak of the Spanish-American war in 1898, the U. S. Government asked Studebaker for 500 wagons to be delivered in 36 hours. They got them in 24 hours. Studebaker wagons served in the Philippines, and in China.

In World War-1, Studebaker was a major supplier of wagons to the U. S. Army, Britain, France, and Russia. They were generally pulled by mules. The bodies were crafted of hickory and ash. The capacity was 2,500 pounds. Shortly after World War-1 ended, Studebaker ended building horse drawn vehicles, to concentrate on

vehicles with engines.

As an aside, the beer wagons pulled by the Budweiser Clydesdales are Studebakers, build around 1900.

The "Studebaker Junior" Wagon was patterned after the farm wagons built through 1920 by Studebaker. The full-size wagon business was then sold to the Kentucky Wagon Manufacturing Company, of Louisville, but the Juniors continued to be built by the South Bend Toy Company through 1941. This wagon had an optional pole which allowed for up to two "goatpower." The same wagon could also be fitted with runners, converting it to a sleigh. Circa 1920, the wagon cost $7.50. (from, http://www.shorpy.com/node/2095).

The description and background from a recent Barrett-Jackson Vehicle Auction states:

“Long before the company started building powered automobiles in 1902, Studebaker was mass-producing 1/2- to 5-ton horse-drawn vehicles of widely varied configuration. From lightweight "Izzer" passenger buggies to U.S. President William Henry Harrison's personal coach, Studebaker was America's preeminent supplier of non-powered wagons and is the world's oldest manufacturer of highway vehicles. This beautifully restored 1906 Studebaker Gulf petroleum delivery wagon features a riveted iron tank with separate internal compartments for bulk transit of kerosene and two grades of motor oil. The metal box on the tail of the wagon is set up to carry Gulf Red Top axle grease and has a metered dispenser pump. Steel tubing with brass nozzles dispense liquids from under the grease box.”

Studebaker wagons also still appear on e-bay, and dedicated farm equipment auction sites.

Fleeing war and religious strife, a talented worker in iron moves to Colonial America, and establishes a new life. Building first wagons, then cars that are sold all over the world, with many still

in service. He founded a vast dynasty and left a huge legacy. Thanks for coming over, Peter Studebaker.

Glossary

Archibald hub – from Archibald Wheel Co. of Massachusetts.
Boxing – Cast iron tapered sleeve on the wooden hub; match to the skein.
Caisson – two wheeled ammunition cart.
Cast iron – carbon content > 2%. Brittle.
Chrome steel – steel with a chromium component – corrosion resistant.
Chromite – $FeCr_2O_4$ – Iron ore, chromium, and oxygen.
Chromium – chemical element number 24.
Conestoga wagon – wagon for use on the steep grades of the Appalachian mountains.
Creosote – tar-based product for preservation of wood.
Devils Claw – levered hook to put the iron rim on the wheel.
Felloe – outer rim of the wheel. Usually covered in iron.
Gee – command for the horse to go right.
Hand – 4 inches, measure of a horses height at the withers;
Haw – command for the horse to go left.
Hound Plate -
ISBN – International Standard Book Number.
Kerogen -a solid organic matter in sedimentary rocks. Released as hydrocarbons when burned.
King bolt - A vertical bolt intended to connect a wagon's tongue to its front axle.
Lazy board – wooden seat fro the driver, slides out from left side.
Linchpin – a fastener that stops a wheel from sliding off the axle.
Linseed oil – oil derived from the flax plant. Preferred for wagon usage.
Nave – the hub.
Oil Shale – sedimentary rock, rich in kerogen.
Oil-tar creosote – wood preservative from oil shale.
Prairie Schooner – wagon for the journey across the planes of the United States West.
PIBN – Pacific Islands Business Network.
Pyrolysis - thermal decomposition of materials in high

temperatures.
Reach – long beam that joins the front and back axles.
Shale oil – oil from oil shale.
Skein – cast iron spindle on wooden axle, match to the boxing.
Soligen steel – stainless steel from Soligen, Germany.
Spindle – axle.
Spoke – radial wooden rods in a wooden wheel.
Stainless steel - Corrosion resistant steel with a minimum of 10.5% chromium.
Steel – iron and carbon, 0.3 to 1.7% by weight.
Teamster – one who drives a wagon.
Tongue – the long beam by which the draft animals pull the wagon.
Tool grade steel – carbon content between 0.5 and 2%.
Wagon – four wheeled vehicle to move freight.
Wagonwright – maker of wagons.
Wainwright – builder of wagons.
Wheel horse – closest to the wagon, on the left. Also called the saddle horse
Wheelwright – makes wheels.
Wither – top of a horse's front shoulder
Wrought iron – carbon content less than 0.25%
Yoke – wooden beam shared by two oxen for pulling.

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Where to see the wagons

This is not a complete list.

- Pioneer Villa Truck Plaza, on OR-228, Halsey, Oregon.

- B&O Railroad Museum, Baltimore, MD. (After the roof collapsed in the roundhouse, the B&O's circa 1830 Conestoga wagon was restored by Green's Carriage Restoration & Museum. It is not known if the wagon was manufactured by Studebaker. . http://www.borail.org//conestoga.aspx
- Allegany Museum, Cumberland, MD.
- Conestoga Area Historical Society, Conestoga, PA.
- https://reallancastercounty.com/history-2/historical-societies/conestoga-area-historical-society-museum.
- Green's Carriage Restoration & Museum 10530 Thrailkill Rd, Orient, OH 43146.
- National Museum of Natural History, Smithsonian Institution, Washington, D. C. has a Conestoga Wagon, but it is unclear if it was built by Studebaker. It is currently not on display.
- Frederick Carriage Museum, 355 Montevue Lane, Suite 100, Frederick MD 21702, 301-600-1646.
- Chats Classic Tractors, chatstractorsonline@hotmail.com
- Thrasher Carriage Museum, Frostburg, Maryland
- Studebaker National Museum, South Bend Indiana.

The wagon in the South Bend museum was crafted by John Clement Studebaker around 1835, for his family's journey from Pennsylvania to Ohio. The Conestoga wagon was a fairly primitive wagon built primarily for cargo. The wagon in the museum has been updated with a later running gear.

https://studebakermuseum.org/archives-and-education/the-

studebaker-history/

Besides the purpose-built Studebaker Museum, many structures used by Studebaker Company survive in South Bend. The Studebaker Assembly Plant, 245,000 square feet of space, has been re-purposed by the City and the State as the Studebaker Innovation Center, an Urban Enterprise area. It hosts an alternate high school, the Center for Entrepreneurship and Education, and numerous neighborhood non-profits.

Resources

- www.studebakerfamily.org
- http://www.germanheritage.com/biographies/mtoz/studebaker.html
- http://www.studebakerfamily.org/
- http://www.mgs.md.gov/reports/Pamphlet_briefmdgeo1.pdf
- http://www.mgs.md.gov/geology/geology_of_maryland.html
- Studebaker Bros Mfg. Co., South Bend, Ind. Catalog (reprint), avail: http://www.hansenwheel.com/store
- Studebaker Trade Catalog, 1911, reprint, avail: http://www.hansenwheel.com/store
- Studebakers in the Civil War, Avail: https://www.familysearch.org/search/catalog/2329256
- The Studebaker family - v. 40-43 (2005-2008) https://www.familysearch.org/search/catalog/1356353
- Studebaker Research Center, Baker's Lookout, near

Hagerstown, MD.

- http://www.historynet.com/studebaker-wagon-the-studie-that-served-on-the-front-lines.htm
- http://www.tripsintohistory.com/2013/10/28/studebakers-frontier-wagons/
- https://www.american-automobiles.com/Studebaker-Brothers.html
- Arizona Journal-Miner, Jul 22, 2908, page 2 of 5, avail, Google News.
- https://americasbesthistory.com/abhtimeline1852m.html
- https://www.farmcollector.com/equipment/wood-wagon-construction-wagon-parts
- http://stagecoachfreightwagon.org
- Allegany Museum – https://alleganymuseum.org
- Thrasher Carriage Museum, Frostburg, MD, https://www.thethrashercarriagemuseum.com
- Wikipedia, various.

Patents

Available at https://patents.google.com

Most of these were invented by employees of, and assigned to. the Company.

- Wagon rack, Enoch H Studebaker, 1913, US1108942A.

- Sideboard for wagons, Studebaker Brothers Mfg. Co.,1913, US990197A.
- Wagon body, Studebaker Brothers Mfg. Co.1914, US1121973A .
- Side-board for wagons, Studebaker Brothers Mfg. Co.1910, US990197A.
- Dumb wagon, Studebaker Brothers Mfg. Co., 1911, CA130741A
- Improved means for securing boxes and the like to vehicles, 1924, GB227763A.
- Hay rake and loader, Noah E. Studebaker, 1909, US937283A.
- Running-gear, Henry B. Studebaker, 1907, US864809A.

If you enjoyed this book, you might also enjoy one of my other books in the Western Maryland series.

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2019 releases

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Transportation options on the Frontier: The Railroads, Canal, and Roads of Cumberland, Maryland.